

CLAIMS

What is claimed is:

1. A method for processing event information for use by a receiver of the event  
5 information, the method comprising the steps of:
  - detecting at least one event;
  - generating a timestamp for the at least one event;
  - storing the at least one event and the timestamp of the at least one event in an  
event batch; and
  - 10 transmitting the event batch to a receiver, such that the receiver of the event batch  
can remotely process the at least one event in the event batch.
2. The method of claim 1 wherein the step of detecting includes the steps of:
  - receiving a plurality of event notifications;
  - 15 filtering the plurality of event notifications according to an event filter function;
  - and
  - detecting when the event filter function indicates that an event is to be stored in  
the event batch, thus providing the detection of the at least one event.
- 20 3. The method of claim 2 wherein the event filter function causes the step of filtering to  
detect a predetermined number of event notifications before indicating that an event is to  
be stored in the event batch.
4. The method of claim 1 wherein the step of detecting an event includes the step of:  
25 creating an event object in response to detecting an action occurring on a sender  
object, the event object specifying
  - i) event functionality corresponding to the action occurring on the sender object;
  - and
  - ii) an identity of an receiver object upon which to perform the event functionality.

5. The method of claim 1 wherein:

the step of transmitting transmits the batch of event to the receiver in response to detecting the occurrence of a batch transfer condition, the batch transfer condition being at least one of:

- 5                   i) determining that a time difference between occurrences of events exceeds a predetermined value;
- ii) determining that a predetermined number of events has been stored in the event batch; and
- iii) detecting that the at least one event is a terminating event.

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6. The method of claim 1 wherein:

the at least one event represents a graphical action performed on an object on a display of a computer system;

                  wherein the event batch contains a plurality of events that represent a sequence of graphical actions performed on sender objects on the display of the computer system; and

15                   wherein the step of transmitting the event batch transmits the event batch to a collaboration adapter for distribution to at least one receiving computer system involved in a collaboration session so that the at least one receiving computer system can recreate events on receiver objects based upon the event batch containing the plurality of events

20                   that represent a sequence of graphical actions performed on sender objects which correspond to the receiver objects.

7. The method of claim 1 wherein:

                  the steps of detecting, generating, storing and transmitting are performed by a processor in a computer system performing a real time event capture process that

25                   operates in conjunction with a browser process to capture graphical events as they occur from user interaction with the browser process.

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8. A computer system comprising:

an input output mechanism;

a processor;

a memory system; and

5 an interconnection mechanism coupling the input output mechanism, the processor and the memory system;

wherein the memory system is encoded with an event transponder process that, when performed on the processor, causes the computer system to perform the operations of:

10 detecting at least one event via the processor;  
determining a timestamp of the at least one event via the processor;  
storing the at least one event and the timestamp of the at least one event in a event batch in the memory system; and  
transmitting the event batch from the memory system through the  
15 interconnection mechanism to the input output mechanism in response to detecting the occurrence of a batch transfer condition, such that a receiver of the event batch coupled to the input output mechanism can remotely process the at least one event in the event batch.

20 9. The computer system of claim 8 wherein when the processor performs the operation of detecting, the processor performs the operations of:

receiving a plurality of event notifications;

filtering the plurality of event notifications according to an event filter function;

and

25 detecting when the event filter function indicates that an event is to be stored in the event batch, thus providing the detection of the at least one event.

10. The computer system of claim 9 wherein the processor performs the event filter function to detect a predetermined number of event notifications before indicating that an  
30 event is to be stored in the event batch.

11. The computer system of claim 8 wherein when the processor performs the operation of detecting, the processor creates an event object in the memory system in response to detecting an action occurring on a sender object, the event object specifying

- 5           i) event functionality corresponding to the action occurring on the sender object;  
and  
          ii) an identity of an receiver object upon which to perform the event functionality.

12. The computer system of claim 8 wherein:

- 10           when the processor perform the operation of transmitting, the processor transmits the batch of event to the receiver in response to detecting the occurrence of a batch transfer condition, the batch transfer condition being at least one of:

- i) the processor determining that a time difference between occurrences of events exceeds a predetermined value;  
15           ii) the processor determining that a predetermined number of events has been stored in the event batch; and  
          iii) the processor detecting that the at least one event is a terminating event.

20   13. The computer system of claim 8 wherein:

          the at least one event represents a graphical action that the processor performs on an object on a display-coupled to the computer system;

          wherein the event batch contains a plurality of events that represent a sequence of graphical actions that the processor has performed on sender objects on the display of the  
25   computer system; and

          wherein when the processor performs the operation of transmitting the event batch, the processor transmits the event batch via the input output mechanism to a collaboration adapter on a computer network coupled to the input out mechanism for distribution to at least one receiving computer system involved in a collaboration session,  
30   such that a processor in the at least one receiving computer system can recreate events on

receiver objects based upon the event batch containing the plurality of events that represent a sequence of graphical actions performed on sender objects which correspond to the receiver objects.

5     14. The computer system of claim 8 wherein:

the processor performs the operations of detecting, generating, storing and transmitting in a computer system by performing a real time event capture process that operates in conjunction with a browser process to capture graphical events as they occur from user interaction with the browser process.

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15. A method for processing event information, the method comprising the steps of:

receiving an event batch identifying at least one event;

calculating a lag time associated with the event batch; and

recreating events identified in the event batch while compensating for at least a

15     portion of the lag time required to receive the event batch.

16. The method of claim 15 wherein the step of recreating includes the steps of:

dividing the number of events contained in the event batch by the lag time to determine a lag time per event; and

20     recreating at least one event identified in the event batch at an event playback time computed by subtracting at least a portion of the lag time per event from an event playback time computed based on a timestamp of the at least one event contained in the event batch.

25     17. The method of claim 16 wherein the step of recreating at least one event identified in the event batch limits the subtraction of the at least a portion of the lag time per event from an event playback time such that an amount of time between consecutive event playback times is a perceptible amount of time at which events are recreated.

18. The method of claim 15 wherein the event batch is an event batch M and the step of receiving an event batch includes a step of:

generating a receive time for the event batch M; and

wherein the step of calculating a lag time required to receive the event batch includes the steps of:

computing an ideal send time for the event batch M; and

computing the lag time as a difference between the receive time for the event batch M and the ideal send time for the event batch M.

19. The method of claim 18 wherein the step of computing an ideal send time for the event batch M includes a step of adding a receive time for an event batch M-1 to an amount of elapsed time between a start and an end time of the event batch M.

20. The method of claim 18 wherein the step of recreating events identified in the event batch includes the steps of:

dividing the lag time by a multiple that is related to a number of events identified in the event batch to determine a lag time per event; and

for each of the at least one event identified in the event batch, performing event functionality defined for that event on a respective receiver object corresponding to an identity of an receiver object defined for that event in the event batch, at an event playback time that is computed based on:

i) a timestamp associated with the at least one event in the event batch; and

ii) the lag time per event.

21. The method of claim 15 wherein the event batch is an event batch other than a first event batch and wherein the method further includes the steps of:

receiving the first event batch;

recreating events identified in the first event batch at respective event playback times computed based on a respective timestamps associated with each event identified in the first event batch; and

performing the steps of receiving, calculating and recreating for all event batches other than the first event batch such that events identified in event batches received after the first event batch will be recreated by taking into account lag time required to receive the event batch in which those events are identified.

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22. A computer system comprising:

an input output mechanism;

a processor;

a memory system; and

10 an interconnection mechanism coupling the input output mechanism, the processor and the memory system;

wherein the memory system is encoded with an event transponder process that, when performed on the processor, causes the computer system to process event information by performing the operations of:

15 receiving an event batch identifying at least one event via the input output mechanism;

calculating a lag time associated with the event batch; and

recreating events identified in the event batch while compensating for at least a portion of the lag time required to receive the event batch.

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23. The computer system of claim 22 wherein when the processor performs the operation of recreating, the processor perform the operations of:

dividing the number of events contained in the event batch by the lag time to determine a lag time per event; and

25 recreating at least one event identified in the event batch at an event playback time computed by subtracting at least a portion of the lag time per event from an event playback time computed based on a timestamp of the at least one event contained in the event batch.

24. The computer system of claim 23 wherein when the processor performs the operation of recreating at least one event identified in the event batch, the processor performs the operation of limiting the subtraction of the at least a portion of the lag time per event from an event playback time such that an amount of time between consecutive event  
5 playback times is a perceptible amount of time at which events are recreated.

25. The computer system of claim 22 wherein the event batch is an event batch M and wherein when the processor performs the operation of receiving an event batch, the processor performs the operation of:

10       generating a receive time for the event batch M; and  
wherein when the processor performs the operation of calculating a lag time required to receive the event batch, the processor performs the operations of:  
          computing an ideal send time for the event batch M; and  
          computing the lag time as a difference between the receive time for the event  
15 batch N and the ideal send time for the event batch M.

26. The computer system of claim 25 wherein when the processor performs the operation of computing an ideal send time for the event batch M, the processor performs the operation of adding a receive time for an event batch M-1 to an amount of elapsed time  
20 between a start and an end time of the event batch M.

26. The computer system of claim 25 wherein when the processor performs the operation of recreating events identified in the event batch, the processor performs the operations of:

25       dividing the lag time by a multiple that is related to a number of events identified in the event batch to determine a lag time per event; and  
          for each of the at least one event identified in the event batch, performing event functionality defined for that event on a respective receiver object corresponding to an identity of an receiver object defined for that event in the event batch, at an event  
30 playback time that is computed based on:



- i) a timestamp associated with the at least one event in the event batch; and
- ii) the lag time per event.

27. The computer system of claim 22 wherein the event batch is an event batch other  
5 than a first event batch and wherein the processor further performs the operations of:  
    receiving the first event batch via the input output mechanism;  
    recreating events identified in the first event batch at respective event playback  
times computed based on a respective timestamps associated with each event identified in  
the first event batch; and  
10 performing the operations of receiving, calculating and recreating for all event  
batches other than the first event batch such that events identified in event batches  
received after the first event batch will be recreated by taking into account lag time  
required to receive the event batch in which those events are identified.

15 28. A method for manipulating objects in a computer system, the method comprising the  
operations of:  
    receiving an event batch defining event functionality to be performed upon at  
least one object in a computer system receiving the event batch;  
    determining a lag time required to receive the event batch; and  
20 performing the event functionality at a relative event playback time on the  
computer system receiving the event batch while compensating for at least a portion of  
the lag time required to receive the event batch.

29. A computer program product having a computer-readable medium including  
25 computer program logic encoded thereon for processing event information, such that the  
computer program logic, when performed on at least one processor within a computer  
system, causes the at least one processor to perform the operations of:  
    detecting at least one event;  
    generating a timestamp for the at least one event;

storing the at least one event and the timestamp of the at least one event in an event batch; and

transmitting the event batch to a receiver, such that the receiver of the event batch can remotely process the at least one event in the event batch.

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30. A computer program product having a computer-readable medium including computer program logic encoded thereon for processing event information, such that the computer program logic, when performed on at least one processor within a computer system, causes the at least one processor to perform the operations of:

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receiving an event batch identifying at least one event;

calculating a lag time associated with the event batch; and

recreating events identified in the event batch while compensating for at least a portion of the lag time required to receive the event batch.

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31. A computer program product having a computer-readable medium including computer program logic encoded thereon for processing event information, such that the computer program logic, when performed on at least one processor within a computer system, causes the at least one processor to perform the operations of:

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receiving an event batch defining event functionality to be performed upon at

least one object in a computer system receiving the event batch;

determining a lag time required to receive the event batch; and

performing the event functionality at a relative event playback time on the computer system receiving the event batch while compensating for at least a portion of the lag time required to receive the event batch.

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